Review of PacifiCorp's Storm Response Report

Utah Holiday Storm – December 2003

May 13, 2004

STATE OF UTAH

DEPARTMENT OF COMMERCE
DIVISION OF PUBLIC UTILITIES

PACIFICORP

UTAH POWER

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WCI Williams Consulting, Inc.

Consultant Report Summary

1 Introduction and Objectives

Williams Consulting, Inc. (WCI) was retained by the Utah Division of Public Utilities (DPU) to review and comment on a series of reports prepared by PacifiCorp, doing business as Utah Power (the Company), in response to widespread outages caused by a major snowstorm that began on December 26, 2003. The series of reports was compiled into one document titled, "Utah Holiday Storm Inquiry – December 2003" (the report). WCI has performed an independent assessment of the report with the following objectives:

- Perform a comprehensive analysis of the report with focus on conclusions and recommendations.
- Comment on the completeness of the terms of reference (TOR) addressed in each section of the report.
- Prepare professional opinions regarding the conclusions and recommendations contained in the report.
- Offer additional conclusions and recommendations with supporting rationale, analysis, and/or industry comparisons as appropriate.

2 Overview of the Company's Report

The Company formed a well-conceived organization structure to investigate the many areas of inquiry addressed in the report. The organization structure provided for three distinct functions: a) executive management, b) overall project management, and c) issue leadership and teams. These teams consisted of subject matter experts for each major topic of the report. In general, we found that the Company invested significant time and effort in producing a report of professional quality. However, the report could have been enhanced by the inclusion of additional industry benchmarks and comparative performance data. This is particularly needed in the areas of staffing levels, reliability performance metrics, and unit maintenance expenditures. WCI has provided such comparative data for the electric utility industry and considered same in formulating our independent judgments.

3 Conformance with the TOR

In general, but with some exceptions, the report chapters were thorough in terms of conformance with the agreed-upon TOR for all major topics and underlying issues. Each section of our assessment begins with an analysis of compliance with the applicable TOR, and indicates our opinion as to what, if any, deficiencies exist. Additionally, we offer a judgment as to whether the deficiency is minor or significant in terms of its impact on the quality and completeness of the report.

4 Comments on the Company's Conclusions and Recommendations

WCI agrees with many of PacifiCorp's conclusions and supports the implementation of all of their recommendations. In addition, as shown below, we have formulated independent conclusions and additional recommendations in key areas of concern. Although PacifiCorp's recommendations are generally supported by an explanatory comment and time frame for decisive action, the recommendations must be converted to an implementation plan including:

- A statement of the recommendation with appropriate explanatory comment(s).
- A concise statement of the implementation objectives, i.e., what the Company wants to accomplish by implementing the recommendation.

- A summary of what will be done to implement the recommendation, i.e., the action steps required.
- An estimate of the benefits and costs of implementing the recommendation.
- A detailed listing of milestones, completion dates, and performance measurements for implementing the recommendation.
- The name and position of the Company official responsible for implementing the recommendation.

In our opinion, the implementation plan should be monitored quarterly by a task force consisting of appropriate representatives from stakeholders to this inquiry process. Absent this level of detail, it will be difficult to monitor and manage implementation of the recommendations in an effective and efficient manner.

5 Conclusions and Recommendations

Based on our review of the report, our independent analysis of the findings and conclusions contained in the report, our industry comparisons with Company performance data, and our professional judgment, we offer the following conclusions and recommendations in addition to those contained in the PacifiCorp report:

5.1 The Storm

Conclusions

WCI concurs with PacifiCorp's conclusion that this was a very significant storm. Based on our conversations with the National Weather Service (NWS) in Salt Lake City and data obtained from NOAA/NCDC, we offer the flowing additional findings and conclusions:

1. The storm was one of the five worst storms since 1928. A ranking follows (largest storms listed first in terms of snowfall):
    i. December 12, 1993, Heavy snow, high water content
    ii. March 22, 1944, Heavy snow and high winds
    iii. Nov 5, 1998, Winter Storm, heavy, wet snow
    iv. 1996 (data not available)
    v. December 26, 2003, as reported by PacifiCorp.

2. The NWS representative we spoke to classified this as a one-in-ten year storm, based on snowfall accumulation.
3. There was a fair amount of rain on December 25th prior to the snowfall. There were several inches of snow on the ground and another 8-10 inches accumulated by 5:00AM 12/26/2003. The Salt Lake City temperatures did not drop below freezing until well after midnight, so there was probably little ice buildup prior to the snow accumulation.

It is clear that while the December 26, 2003 storm was not the largest in recent history, it contained a confluence of factors, including drought-weakened trees coupled with the high water content in the snowfall, as explained by PacifiCorp, that caused widespread power supply problems causing many trees and tree limbs to break and affect power lines.

Recommendations

We concur with PacifiCorp's recommendation and offer no additional recommendations.

5.2 Utah Power's Response

Conclusions

The failure of the CADOPS system and the resulting limitation of information available to those coordinating the restoration effort certainly affected the ability of PacifiCorp to optimize the restoration process. In addition, nearly 48 hours elapsed from the time that CADOPS failed to the implementation of a grid restoration process. This leads us to conclude that the Company was "flying blind" in the overall restoration process during that time period. We do understand, however, that the SCADA system provided indication of major equipment operation and therefore could identify major feeder outages. This permitted the Company to respond to those situations and therefore effect restoration of potentially large numbers of customers. Nonetheless, without the ability to infer outages using CADOPS, we conclude that the overall duration of the outage may have been shorter had CADOPS been in operation, and we concur with the Company's statement that some customers may have been out of power for a longer period than otherwise

Recommendations

We concur with the Company's recommendations, and offer the following additional recommendations:

1. Conduct periodic "table-top" exercises for emergency response evaluation and include City and State emergency organizations in the simulation.
2. Consider participating in EEI's "Restore Power" service, which provides real-time ability to request assistance. This service includes both utilities and contractors.

5.3 Technology Issues

Conclusions

We concur with PacifiCorp's conclusions and related findings, but we believe that the Company may have spent too much time trying to "fix" CADOPS during the height of the storm.

Recommendations

We concur with PacifiCorp's recommendations. While the following items are discussed in PacifiCorp's report, they were not identified as specific recommendations and therefore have been included here.

1. Review telephone system bottlenecks that may exist in either outgoing or incoming trunk capacity.
2. Consider enhancing the IVR system to better facilitate the ability to modify messaging on the fly in order to provide current outage and restoration status information to the callers.

5.4 Vegetation Management

Conclusions

It is not entirely clear to WCI whether the Company's conclusion that "the extent of tree-caused damage was due more to the magnitude of the storm than inadequacies in the vegetation management program" is fully supportable. First, the Company admits to historically low vegetation management expenditures during the recent past. Second, in the four-year period between January 1, 2000, and December 31, 2003, PacifiCorp Vegetation Management completed on cycle roughly 7,100 of 11,100 Utah overhead distribution line miles. This accounts for 64% of the overhead distribution line miles in the state, or a 6.4-year cycle rate compared with the recommended 3-year tree trimming cycle. And finally, the Utah Power annual survey of tree

conditions, last conducted by its utility arborists in November and December 2003, found between 22% and 39% of Utah trees that could potentially affect PacifiCorp facilities were currently in contact with the conductors. We conclude that three factors contributed to the numerous tree-related outages during the storm: (1) the vegetation management program was significantly below its target of a three-year tree trimming cycle, (2) many trees were most likely in a weakened and brittle condition due to persistent drought conditions, and (3) the accumulation of wet, heavy snow

Recommendations
WCI supports and concurs with PacifiCorp's recommendations and offers the following additional recommendations:

1. Accelerate the Vegetation Management program to reach compliance with a 3-year tree trimming cycle as soon as possible.
2. As an initial step, PacifiCorp should be required to provide periodic status reports to the DPU as to its progress in meeting the 3-year tree trimming cycle goal. If the regulatory agency is not satisfied with the progress or results, mandated vegetation management standards should be imposed by the regulator.

5.5 Investment Standards

Conclusions
We agree with PacifiCorp's conclusions and actions relative to capital programs, but would like to point out that we believe that budgets for maintenance should be improved as discussed in Section 4.6, "Reliability and Maintenance", of our report. In our review of investment standards, we found that the Company provided estimates of some of the costs to place facilities underground, but did not provide total costs. We believe that this could potentially confuse the casual reader.

Recommendations
We concur with PacifiCorp's recommendation and offer no additional recommendations.

5.6 Reliability and Maintenance

Conclusions
WCI agrees with PacifiCorp's conclusions and applauds the Company's recent initiatives intended to improve system reliability and maintenance. We note however that some of the programs listed in the report are capital rather than maintenance programs. We also find and conclude the following:

1. PacifiCorp (Utah) is close to achieving its cycle targets on inspections and preventative maintenance, but corrective maintenance lags and the backlog of maintenance work orders is growing.
2. Maintenance expenditures for fiscal years 2002 and 2003 are lower than industry averages (e.g., $27/customer and $996/kWH sold in Utah versus $45/customer and $2,395/kWH sold in the industry). Further, the previous seven year's of historical maintenance expenditures were much lower. As a result, there is need for aggressive "catch up" spending, and it is not clear whether the Company's future maintenance budgets go far enough.
3. The significant staffing reductions, implemented over the past 10 to 12 years, of customer-facing employees (discussed in Section 4.7 of this report), even with the addition of contractor staff (only some of which are assigned to maintenance) raises the issue of the adequacy of staffing levels as related to reliability and maintenance.

4. Based on an analysis of outage data provided by PacifiCorp to the DPU, we found that equipment-related outages over the 2001 to 2003 period amounted to an average of 45% of all outages (excluding filed major events). This is substantially higher than industry experience. EEI, in its 2002 Reliability Report, shows a figure of 25% for all equipment related outages (excluding major events) on overhead and underground equipment. This further raises questions relative to the adequacy of maintenance programs.
5. During a field inspection tour of the Kempner Road area of the distribution system, we noticed one or two leaning poles, several split cross-arms on poles, a number of insulators sitting directly on cross-arms, several slack spans of overhead wire, and a guy wire anchored in the sidewalk. While these situations may be isolated and not endemic to the system, they do raise questions as to whether the comprehensive maintenance plan is being executed as intended.

Recommendations

While WCI fully concurs with PacifiCorp's recommendation, we do not think it goes far enough in light of our findings and conclusions. According to the company's "Resource Review: Distribution Business" dated November 2002, prior to the recent formation of an asset management department there was no defined maintenance plan or maintenance budget. It is further noted that the condition of the network in Utah is generally in worse condition than Oregon due to a historical lack of maintenance in Utah compared to a State mandated maintenance program in Oregon. Moreover, the maintenance strategy proposed in the Resource Review (the "$51M" Plan on page 9) will not improve the average condition of the network and is unlikely to do better than sustain present outage performance.

The intent of our recommendations is to determine whether the Company needs to provide additional financial and human resources, beyond its maintenance budget forecast, in order to improve the condition of the distribution system and its reliability performance. Therefore, we recommend the following:

1. Conduct a maintenance plan audit to determine whether the Company is performing all inspections, testing, preventive and corrective maintenance in conformance with its maintenance plan requirements.
2. Modify and expand the maintenance priority codes and schedules to specify the types of conditions requiring immediate corrective action, within one month, six months, and one year.
3. Institute a rigorous program to prioritize, schedule and track corrective maintenance for both "A" and "B" (and expanded codes as above) maintenance items.
4. Perform a physical inspection of a sample of the distribution system including conductors and ancillary equipment, poles and all attachments, cross-arms, protective devices, lightening protection, transformers, switches, regulators, substations, and right-of-way conditions.
5. Review and update the Distribution Business Resource Plan last prepared in 2002.
6. Provide suitable increases in baseline maintenance budgets and resources in order to keep up with corrective maintenance work orders such that system reliability improves. This item would involve two distinct and significant activities:
   a. Evaluate baseline maintenance budgets to properly support corrective maintenance and system reliability targets
   b. Assess resource requirements based on the work plan to provide adequate resources (contracted and internal) to support the plan
7. Mount a "catch-up" maintenance program in order to substantially reduce the outstanding corrective maintenance items within a short time period and with a view to improving system reliability, particularly SAIFI. Further, the Company should, jointly with the DPU, determine

a reasonable and measurable target for SAIFI performance improvement and/or reduction of equipment failure outage frequency as an expected outcome of increased maintenance spending

8. Perform an annual review and comparison of PacifiCorp's Utah reliability metrics against itself, PacifiCorp other than Utah, and an industry benchmark panel

5.7 Organization and Resourcing

Conclusions

While WCI is in agreement with the Company's recent initiatives intended to increase access to skilled personnel during storms and to increase the ongoing staffing levels of customer-facing employees in Utah, we are unable to comment on the quality of analysis used by the Company to determine its staffing needs. The Distribution Business Resource Review of November 2002 recognizes the need to increase staffing levels but does not explain the analytical methodologies employed. We also note that the employee surveys conducted in years 2001 and 2003 found that 59% and 61% of the respondents, respectively, believe there are resource constraints in the power delivery organization. Therefore, we find and conclude the following:

1. The Company has not provided any comparative industry staffing benchmarks to provide support for the reasonableness of its staffing levels.
2. During the period of 1990 through 2002, the Company reduced its customer facing work force in Utah from 1831 employees to 895 employees, a decrease of 51%. The Company did, however add contractor resources to supplement its internal workforce. The Company has not been able to provide specific breakdowns of the contractor resources between capital and maintenance activities, although the Company indicated that the majority of contractor work is in the area of service connections. This leads us to conclude that the effective decrease in customer facing work force may be somewhat less than 51%. During the 1994 to 2004 period, the Company experienced customer growth of 31%. This implies a significant increase in labor productivity and raises questions regarding the amount of operation and maintenance work able to be accomplished at such reduced staffing levels.

Recommendations

The company's Distribution Business Resource Review of November 2002 cites risks resulting from the low level of resources to meet current workloads. The risks include excessive amounts of overtime, working in violation of the hours of service requirements of the Department of Transportation, and potential violation of regulatory obligations. Regarding overtime, the resource review found internal crews working up to 94% overtime in some areas, and 38% on average in Field Operations. Moreover, the limited number of skilled Plant employees resulted in the diverting of resources from maintenance work to capital projects. These conditions coupled with findings included in the previous section of our report raise serious concerns regarding staffing levels. As a result, we recommend the following:

1. Perform an activity analysis of the Company's comprehensive maintenance plan to determine the number of annual man-hours by job classification required to execute all plan requirements. Convert man-hour requirements to full-time employee equivalents considering factors such as vacations and holidays, sick time, and labor productivity rates. This analysis will suggest a minimum staffing level (including an appropriate level of contract resources) required to fully implement annual inspection, testing, preventive and corrective maintenance activities included in the maintenance plan.

2. Consider engaging an outside company to perform an independent assessment of staffing needs in Utah in order to assure objectivity and minimize the potential impact of PacifiCorp budgetary constraints.

5.8 Comparative Performance and Benchmarking

Conclusions

While PacifiCorp offers reasoning as to why they have not included industry benchmarks, we find that such benchmarks provide value in identifying areas on which the Company should focus to better understand their performance relative to others and to use this information to seek out other panel members whose performance appears to be best-in-class. This can lead to identification of best practices that are applicable in Utah Power and/or all of PacifiCorp

Recommendations

WCI supports and agrees with PacifiCorp's recommendations. We believe, however, that PacifiCorp should expand its benchmarking efforts to provide comparisons to industry. In this context, we understand that PacifiCorp has signed up for and is participating in PA Consulting Group's current T&D Benchmarking program and we applaud the Company's decision to do so. We offer the following additional recommendations:

1. Given the physical, geographical, staffing, budgeting and performance differences among the company's various state operations, PacifiCorp should expand its recently initiated participation in the PA utility T&D benchmarking program to include separate reports for each of PacifiCorp's state operations, at least for Utah.
2. Participate in both I.E.E.E. and EEI reliability surveys to provide additional insight as to relative performance.

5.9 Major Event Definition and Compensation

Conclusions

WCI concurs with PacifiCorp's conclusions and we add that adoption of a consistent method of determining major events will bring benefit to PacifiCorp and the industry in general as it will allow more meaningful comparisons of performance metrics, particularly reliability measures. However, the proposed method may result in a higher count of excludable events thus improving the reliability metrics excluding storms. We believe this trade-off is justified.

Recommendations

We concur with PacifiCorp's recommendation and offer no additional recommendations.